

ARCS PROCEDURE:	RSR LOGGER CALIBRATION PROCEDURE (CALF)	PRO(RSR)-005.003
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RSR Logger Calibration Procedure (CALF)

I. Purpose:

This document describes the method for field calibrating the A/D converter, adjusting the Filter Detector heater voltage (temperature), measuring the CPU clock frequency and measuring the Filter Detector 2nd stage amplifier gains. **Note: this procedure is not normally performed yet during routine RESET visits.**

II. Cautions and Hazards:

- Perform this procedure as a Bench Calibration and Measurement Documentation Procedure.

III. Requirements:

- The analog to digital reference voltage is the only logger board adjustment critical to the MFRSR calibration. The reference voltage is set to 4.0960 V or 1 count = 1 millivolt.
- The second stage filter detector amplifier gains are fixed by the ratio of the gain resistors. The gains may drift a slight amount with age. The only way the gain is changed is by changing or replacing the gain resistors (Rg).
- The heater voltage adjustment sets the internal operating temperature in the filter detector head assembly. A general requirement is that this temperature be a few degrees C higher than highest local ambient temperature recorded. (The North Slope Alaska instruments should have a lower set point than the TWP units, which could be lower than the SGP units.) Temperatures on the SGP can reach 120° F.
- Complete an "as-found" document that uses a calibration sheet marked "AS FOUND" for an operating logger before any adjustments are made to the A/D and heater voltages.
- The CPU clock frequency is not adjustable but nevertheless may change with age. Corrections for clock drift are made in software.
- The second amplifiers for the filter detectors should also be very stable, but it is wise to do an "as found" check on their gains and record the RG gain resistor values.

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IV. Procedure:

A. Steps:

1. Turn OFF power switch (AC Line and or DC power to datalogger). (If you are using a battery, disconnect it.)
2. Remove the MFRSR logger board from its enclosure and head for the test bench.
3. Install the logger on the test platform, connect the DC power supply (14 V max) to the logger, connect comm port 1 for a laptop, (portable notebook), to the logger using the 9 pin D to pin D communications cable.
4. Install the calibration connector on header 15 (see Attachment 1, Test Points and Adjustment Pots).
5. Connect calibrated voltage source. (The + lead from the voltage source connects to the pins (wires) labeled detector input.)
6. Set the voltage source to 0 V output.
7. Set up the laptop to locally talk to the logger.
8. Wait until the setup string from the logger is finished, and then turn ON the DC power to the logger.
9. Log-on to the logger and give the **A \$nnn** command. Scan all 32 channels. Stop the continuous scanning by pressing any key on the Laptop. Just look at the general health of the logger.
10. Let the logger warm up a few minutes. Do not make any adjustments to A/D reference voltage or heater voltage.
11. Check the A/D reference voltage and heater set point (temperature) voltage. Compare these readings to the readings recorded on the last valid calibrations sheet for the logger.
12. IF the A/D reference voltage is out by 2% or more, fill out a calibration sheet marked "As Found," recording the "as-found" voltages.
13. Also record the heater voltage, CPU clock frequency, and second-stage detector amplifier counts at three points. (Second-stage filter detector amplifier counts are corded with 0.0000 V input, +0.4 V input and -0.4 input (three sets of numbers).)

Note: You now have a permanent record of the "as-found" calibration condition of the logger.

14. With the "as found" condition recorded, make adjustments to the A/D reference voltage adjusting it to 4.0960 V. and fill out a new calibration sheet with all the blanks completed: the A/D Ref voltage, heater voltage,

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CPU clock frequency, and the second stage filter detector counts for the three input voltages.

15. Reinstall the logger into the MFRSR system.
16. Turn power ON.
17. Enter change on the site operations log.
18. Report date and time of all “as-found” conditions and change new calibrations. (TBD)

V. References:

None.

VI. Attachments:

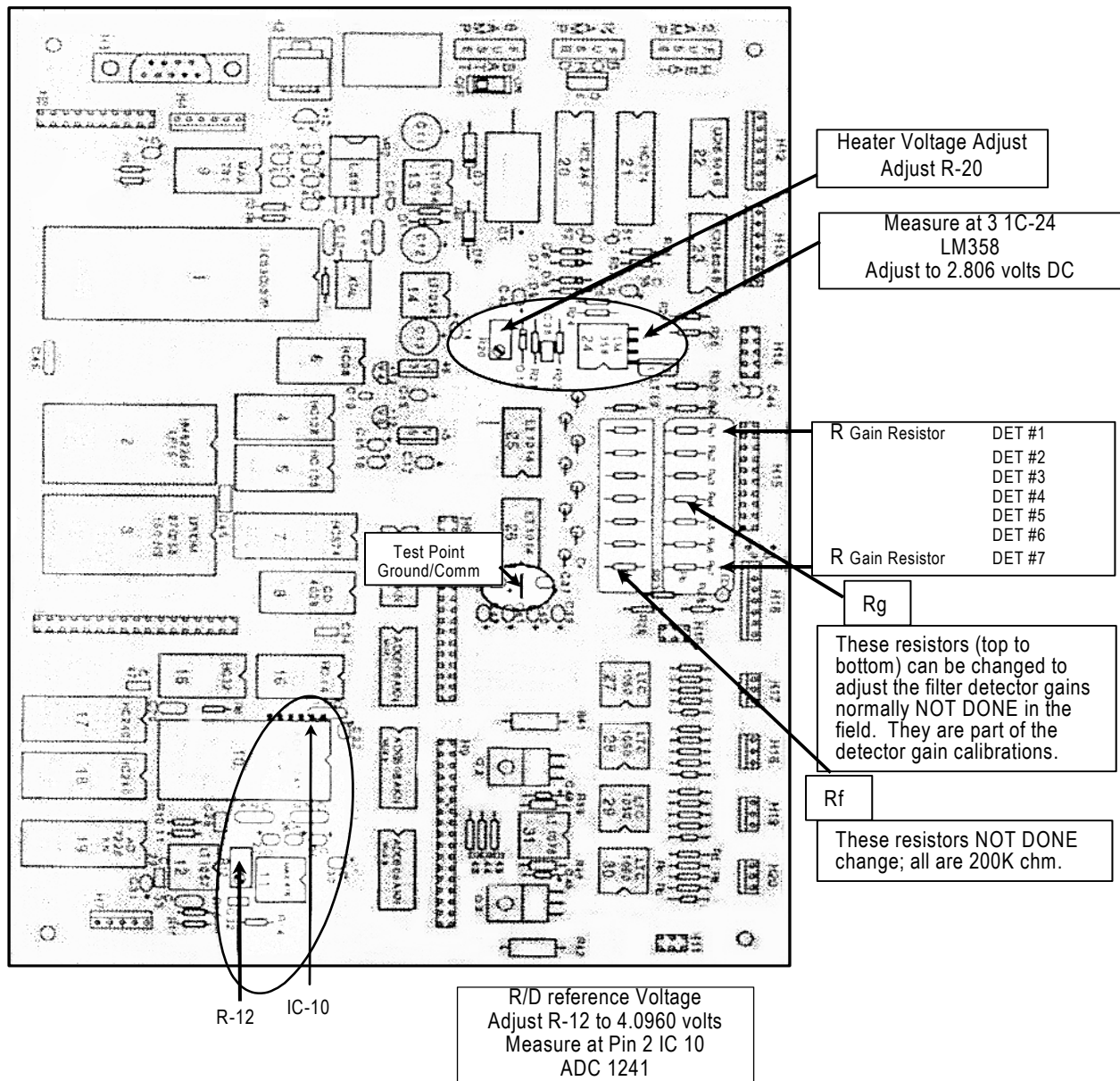
1. Test Points and Adjustment Pots
2. Second-Stage Filter Detector Amplifiers and Signal Flow
3. Actual Connections Laptop, Calibrations Connector, and Test Points
4. Calibration Form

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Attachment 1: Test Points and Adjustment Plots

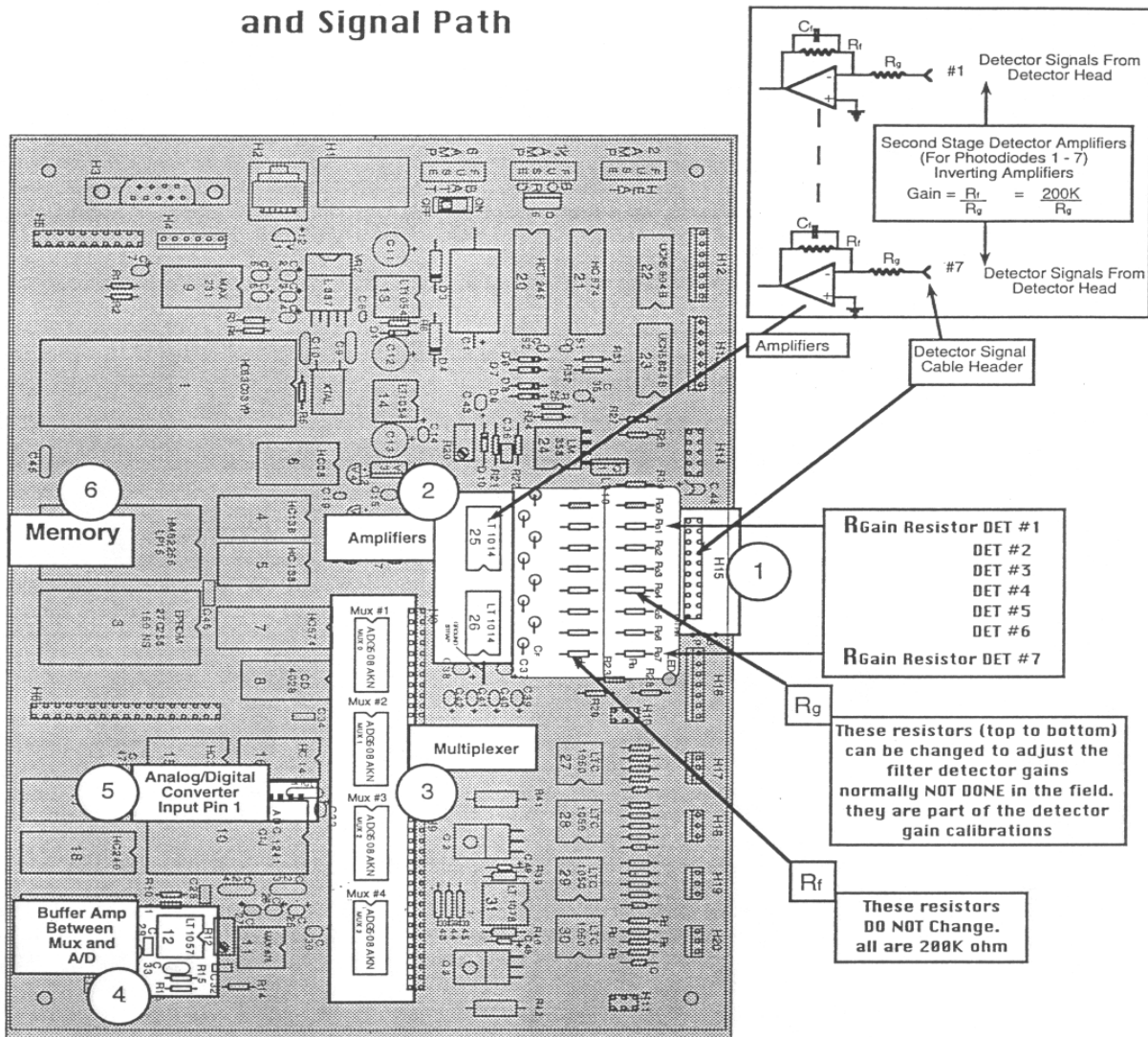
MFRSR LOGGER PRINTED CIRCUIT BOARD

R/D Reference Voltage
Heater Voltage
Filter Detector Logger Board Gain Resistors
ADC Reference Voltage Adjustment
Heater Voltage Adjustment

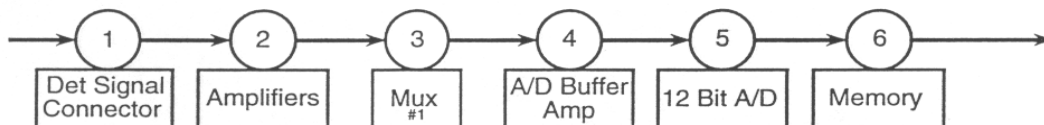


Attachment 2: Second-Stage Filter Detector Amplifiers & Signal Flow

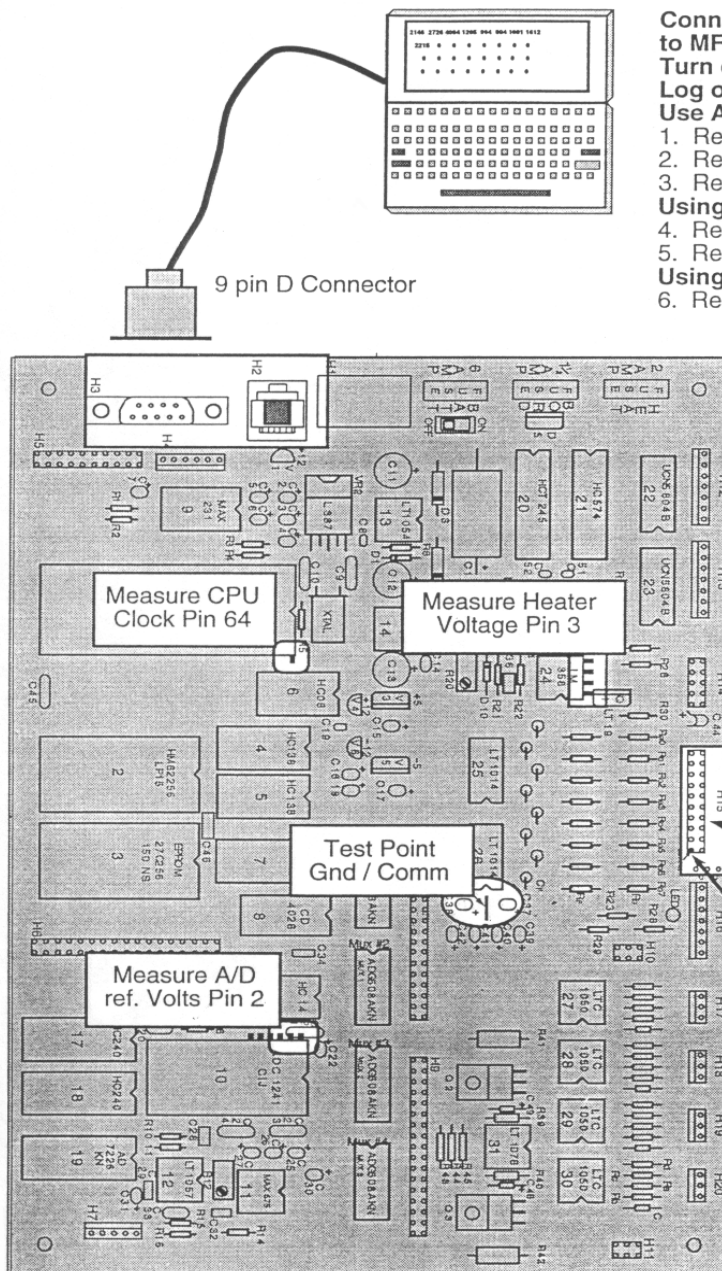
MFRSR LOGGER PRINTED CIRCUIT BOARD Filter Detector Second Stage Amplifiers Gain Resistors and Signal Path



Filter Detector Signal Flow



Attachment 3: Actual Connections Laptop, Calibrations Connector, and Test Points

MFRSR LOGGER PRINTED CIRCUIT BOARD
Filter Detector Second Stage Amplifiers
Calibration Procedure

Connect LapTop and Voltage Source to MFRSR Data Logger.
Turn on power to data logger
Log on to the data logger
Use A ### command to scan all 32 channels

1. Record counts for Zero (0) volts input
2. Record counts for +0.5 volts input
3. Record counts for -0.5 volts input

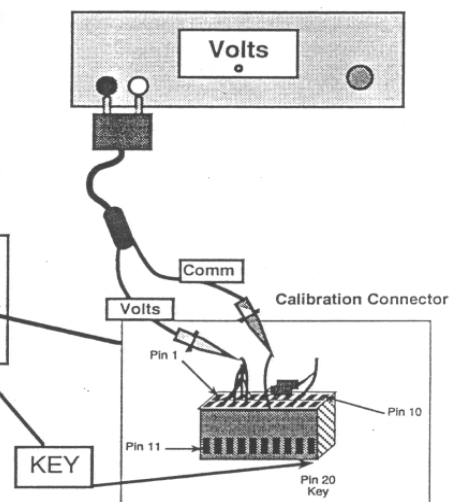
Using a precision Volt Meter

4. Record Heater voltage
5. Record A/D Reference Voltage

Using a Precision Frequency Meter

6. Record the CPU Clock Frequency.

Connect Calibrated voltage Source to Calibration Connector and Connect to H 15 - Logger (Filter Detector Inputs)



Calibration Connector Pinout

Pin	Description
1	N/C
2	Detector 2 Input
3	Detector 4 Input
4	Detector 6 Input
11	Detector 1 Input
12	Detector 3 Input
13	Detector 5 Input
14	Detector 7 Input
5	T2 input head Temp.
15	T1 input heater control
6	Gnd/Common
16	Gnd/Common
7	Heater N/C
17	N/C
8	+5VDC N/C
18	T1 & T2 volts
9	-5VDC N/C
19	N/C
10	Heater N/C
20	N/C

5.11 K ohm 2 ea.

Thermistor T1 Head Heater control and T2 Head Temperature are replaced by 5.11 K resistors simulating Detector Head Temperature a couple degrees above 40 C.

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Attachment 4: Calibration Form

MFRSR LOGGER CALIBRATION SHEET				
DATE: LOGGER BOARD TYPE 32 CH _____ 16 CH _____ SERIAL NUMBER _____ IF 16 CH AUX BOARD SN _____				
E CLOCK FREQUENCY _____ MHz REFERENCE VOLTAGE _____ VOLTS HEATER VOLTAGE SET _____ VOLTS				
Channel	INPUT VOLTAGE			Resistor/Resistor-- Gain
(Detector)	0.0000 Vdc			
	COUNTS			
				200K/
				200K/
				200K/
				200K/
				200K/
				200K/
				200K/
COMMENTS: _____ _____ _____ _____ _____ _____ _____ _____				
SIGNED:				
July 16, 1998				